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(54) **Filler neck closure**

(57) The invention relates to a closure (2) engageable with a filler neck (1) comprising an opening (10) and a seal seat (11) disposed axially facing said closure, the closure comprising a cup-shaped body having a bottom (3) and a peripheral wall (5), a sealing means (25) for contacting said seal seat, and releasable fastening elements (6) interacting with the filler neck. At least two fastening elements are arranged to extend axially from the peripheral wall and each fastening element is arranged to engage with a corresponding locking means (16) located on the outer periphery of the filler neck remote from and facing away from the central axis of said opening.

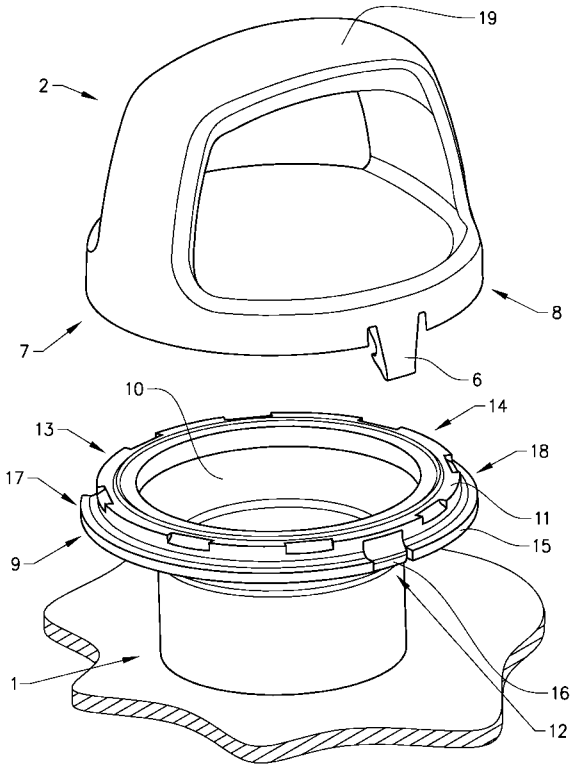


FIG. 2

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Description

TECHNICAL FIELD

[0001] The invention relates to a filler neck closure provided with snap-on attachments for locking the closure in place. This allows the closure to be pushed straight onto the filler neck. The closure is removed by tilting and pulling a fixed gripping means on the closure to release the snap-on attachments. The invention is primarily intended for use on vehicles.

BACKGROUND ART

[0002] Common solutions for closing a filler neck include closures or caps with a threaded connection or bayonet connection. Both types of connection suffer problems relating to relatively high friction forces when twisting the closure to remove it prior to re-filling. The problem is usually caused by a seal made from rubber or a similar material being compressed to seal against a mouth surrounding the opening of the filler neck. Overcoming the friction between the contacting surfaces of the seal and the mouth may often require significant force.

[0003] The above problem may be compounded by the seal sticking to the mouth of the filler neck, thereby increasing the required force to overcome the friction between the contacting surfaces. If the friction force is too high, a tool may be required to remove the closure. This may sometimes cause the closure to be damaged during removal.

[0004] An object of the invention to provide an improved closure for a filler neck, which closure is both held securely in place and is removable using a minimum of force. A further object of the invention is to provide a sealing arrangement for such a closure, which sealing arrangement allows removal of the closure without its seal sticking to a contacting surface.

DISCLOSURE OF INVENTION

[0005] The invention relates to a filler closure, a filler neck to be engaged by said filler closure and a combustion engine provided with such a filler closure, in accordance with the attached claims.

[0006] According to a preferred embodiment, the invention relates to a closure or cap engageable with a filler neck comprising an opening and a seal seat disposed axially facing said closure. The closure comprises a cup-shaped body having a bottom and a peripheral wall, a sealing means for contacting said seal seat, and releasable fastening elements arranged for interaction with the filler neck. The peripheral wall is preferably, but not necessarily, cylindrical. For instance, in order to assist location of the closure relative to the opening and the filler neck, the cross-sectional shape of the peripheral wall at right angles to the bottom may be substantially oval. At least two fastening elements extend axially from the peripheral wall. Each fastening element may be arranged to engage with a corresponding locking means located on the outer periphery of the filler neck, which locking means may comprise a locking surface located remote from and facing away from the central axis said opening of the filler neck. According to a further example of the preferred embodiment, the closure may comprise at least three fastening elements.

[0007] The fastening elements may be arranged symmetrically around the periphery of the peripheral wall. In this way each adjacent fastening element may be separated by 180°, 120°, 90°, etc around the outer periphery of the closure. This may allow the user to attach the closure onto the filler neck at any relative position where the fastening elements may connect with corresponding locking surfaces in a peripheral edge surrounding the opening at an upper portion of the filler neck. This solution may be used when the relative position of the closure and the filler neck is of less importance. When the position of the closure may be chosen at random, guide means in the peripheral edge surrounding the opening are not necessary. Hence the locking surface may comprise a continuous circumferential recess or protrusion around the filler neck. Alternatively, a number of guide means, equal to or fewer than the number of fastening elements, may be provided to allow the closure to be indexed in a predetermined number of fixed positions.

[0008] Alternatively, the fastening elements are arranged asymmetrically around the periphery of the peripheral wall. According to one example, a closure with three fastening elements may have a first element on one side of the closure and a second and third element on the other side of the closure. The latter elements may be located at equal angles relative to a bisector created by a diametric line intersecting the first element. Hence if the second and third elements are located at angles up to 50° relative to the bisector, the angle between the first element and an adjacent element on either side is less than 130°. Alternatively, the angles between each subsequent fastening element may be different, such as 90°/120°/150° for a closure with three elements. This allows the user to attach the closure onto the filler neck in a single position only where each of the fastening elements may mesh with a corresponding guide surface in a peripheral edge surrounding the said opening. This solution may be used when the relative position of the closure and the filler neck is used for facilitating an ergonomic grip or for the user. In addition, a correctly positioned closure may be used for conveying important or required information about the closure, the substance to be filled, etc to the user.

[0009] The fastening elements may each comprise a resilient tongue arranged to extend towards and engage a corresponding locking means on the filler neck by means of a snap action. The resilient properties of the tongues may be controlled by selecting a suitable material and calculating a desired length and with width of

each tongue. The tongues may all be identical or may be given different dimensions This selection and dimensioning determines properties such as the force exerted by the resilient elements on the filler neck to hold it in place, and the force required for removing the closure.

[0010] Each fastening element may be an integrated part of the peripheral wall of the closure. As such, each fastening element may extend forwards from the front edge of the peripheral wall in its entire length or be formed in the peripheral wall itself by substantially parallel slits along generatrices in said wall. Alternatively, the fastening elements may be formed by substantially parallel slits in the peripheral wall and be provided with a front portion extending forwards from the front edge of the peripheral wall.

[0011] The closure may be provided with locking means provided with contact surfaces for cooperation with corresponding locking means comprising a protrusion extending circumferentially around at least part of the filler neck. Alternatively, the locking means may comprise a recess extending circumferentially around at least part of the filler neck.

[0012] The contact surfaces are angled relative to the outer periphery of the filler neck so that a plane in the main direction of each contact surface is angled so that it diverges from a central axis of the filler neck in the direction of the opening. The protrusion or recess in the outer surface of the filler neck may have a shape that substantially conforms to a corresponding contact surface, so that the contact surface on a fastening element can mate with a corresponding locking surface on the protrusion or recess when the closure is mounted on the filler neck. Each contact surface may comprise a substantially flat surface, although at least a part of the surface may also have a predetermined curvature in a radial plane through the closure. For instance, a first section of the contact surfaces adjacent the base of a resilient tongue may comprise a substantially flat surface is angled so that it diverges from a central axis of the filler neck in the direction of the opening. A second section may be substantially J-shaped, curving downwards and inwards, towards a radial plane through the filler neck. This second section may be relatively short and can cooperate with a similarly curved section of the corresponding locking surface to achieve a more secure locking of the closure onto the filler neck.

[0013] The closure may comprise at least one guiding means guiding means interacting with the filler neck for locating the closure relative to the filler neck. According to one example, the fastening elements may be arranged to act as guiding means, interacting with corresponding recesses or protrusions. Alternatively, the closure and the filler neck may be provided with separate guiding means and corresponding guide surfaces to facilitate for the user to index the closure relative to the filler neck prior to mounting.

[0014] When mounting the closure, the closure is first lined up relative to the filler neck before being moved towards said filler neck. The resilient tongues making up the fastening elements are first forced radially outwards when contacting locking means on the filler neck. In order to facilitate this displacement of the resilient tongues, an inner surface of the tip of each resilient tongue may be beveled so that the innermost surface at the tip is located radially inside an outermost surface of the locking means at the periphery of the filler neck adjacent the opening. As the a sealing means on the closure comes into contact with the seal seat around the opening of the filler neck, the resilient tongues will substantially simultaneously snap into contact with locking surfaces on their respective protrusion or recess. The angle and/or the shape of the cooperating surfaces of the mating contact and locking surfaces, in combination with a continued radial deformation of the resilient tongues, will provide a sufficient force for retaining the closure in place on the filler neck.

[0015] In order to remove the closure the user may grip the closure and tilt it relative to the filler neck. The closure may, for instance, be tilted towards the user about an imaginary axis located at a tangent to a contact point between a radially outer and upper part of the filler neck and an inner and lower part of the peripheral wall. When titling a closure having three asymmetrically positioned tongues in what is deemed the most natural direction for the user, an imaginary axis around which the oil filler cap is tilted may be substantially parallel to a line intersecting the base of those two resilient tongues located closest together. For a closure having three symmetrically arranged tongues, this applies to any two adjacent tongues. A predetermined force applied to the closure in this way will overcome the retaining force of the resilient tongue on the side of the closure facing away from the user. Preferably, but not necessarily, the force applied by the user in a direction deemed most ergonomic should be concentrated to as few resilient tongues as possible. However, the invention is not limited to this example, as the user may tilt the closure in any convenient direction in order to open it. The closure may also be opened by pulling it straight out from the filler neck, but this will require a relatively large force.

[0016] In order to facilitate for the user to remove the closure or cap, it may be provided with a suitable handle or grip. According to one example, the handle may be substantially U-shaped and attached across the upper surface of the closure to allow two or more fingers to be inserted through said handle. Alternatively the handle may comprise a bar extending across the upper surface of the closure, where a recess in the upper surface allows the user to grip around said bar to remove the closure. According to a further example, the closure may be provided with a substantially T-shaped handle or grip, wherein the user may grip a horizontal bar located substantially parallel to and remote from the upper surface of the closure. By arranging at least a portion of the handle remote from the upper surface, as described in the above examples, an improved grip is provided for the user. By providing a handle or grip of this type there will also be

sufficient space on the upper surface of the closure for symbols or text conveying instructions or a warning to the user.

[0017] The sealing means provided in the closure may be an annular flat seal comprising a resilient material, such as rubber. The type of material used in the seal is selected so that it is suitable for exposure to the liquid filled into the filler neck. The flat annular seal is arranged for cooperating contact with the seal seat facing the closure. In order to reduce the risk of the seal sticking to the seal seat, the seat may be provided with a raised circumferential ridge on its upper surface. When the seal is pressed against the seal seat during mounting of the closure, the ridge will be forced into the facing surface of the seal. The local compression of the seal caused by the ridge may assist in maintaining a tight and leak proof seal, as well as assisting in pushing the closure away from the seal seat when the closure is opened.

[0018] The filler neck and its closure as described above are particularly suited for use in a vehicle. For example, an internal-combustion engine having an oil filler neck provided with an oil filler opening may be provided with a closure according to the invention. In the case of an oil filler closure the invention allows a conventional O-ring to be replaced by a flat, annular seal and significantly reduces the force required to remove the closure.

BRIEF DESCRIPTION OF DRAWINGS

[0019] In the following text, the invention will be described in detail with reference to the attached drawings. These schematic drawings are used for illustration only and do not in any way limit the scope of the invention. In the drawings:

Figure 1 shows a perspective view of a filler neck with a closure in the form of an oil filler cap, according to a first embodiment of the invention;

Figure 2 shows the filler neck of Figure 1 with the oil filler cap removed;

Figure 3 shows a lower perspective view of the oil filler cap of Figure 1;

Figure 4 shows a cross-sectional view through the oil filler cap of Figure 1.

EMBODIMENTS OF THE INVENTION

[0020] Figure 1 shows a perspective view of a filler neck 1 with a closure 2 according to a first embodiment of the invention. According to this embodiment, the closure is an oil filler cap 2 engageable with an oil filler neck 1 on an internal combustion engine. The oil filler cap 2 comprises a cup-shaped body having a bottom 3 with an upper surface 4 facing the user and a peripheral wall 5. The peripheral wall 5 is provided with releasable fastening elements in the shape of resilient tongues 6, 7, 8 arranged for interaction with the filler neck 1. The embodiment shows an oil filler cap 2 held in place by three resilient tongues 6, 7, 8 (one shown). The resilient tongues 6, 7, 8 will be described in further detail in connection with Figures 3 and 4 below. The peripheral wall 5 shown in this example is cylindrical and is substantially concentrically mounted onto an upper section 9 of the filler neck 1. In this example, three resilient tongues 6, 7, 8 are integrated in and extend axially from the peripheral wall 5.

[0021] Figure 2 shows the filler neck 1 of Figure 1 with the oil filler cap 2 removed. As shown in Figure 2 the filler neck 1 comprises an opening 10 and a seal seat 11 disposed axially facing said oil filler cap 2. Each resilient tongue 6, 7, 8 is arranged to engage with a guiding means 12, 13, 14 in the upper section 9 of the filler neck 1. In this example each guiding means is in the form of a recess 12, 13, 14 located in an outer peripheral edge 15 of the upper section 9 of the filler neck 1. The recesses 12, 13, 14 are located remote from said opening 10 and below the upper surface of the seal seat 11 of the filler neck 1. The radially inner section of the recesses 12, 13, 14 are provided with locking means comprising locking surfaces 16, 17, 18 facing away from the central axis X of the opening 10, as will be described in further detail below.

[0022] The resilient tongues 6, 7, 8 are arranged asymmetrically around the periphery of the peripheral wall 5. This allows the user to attach the oil filler cap 2 onto the filler neck 1 in a single position where each of the resilient tongues 6, 7, 8 are used to guide the oil filler cap 2 into position using the recesses 12, 13, 14 in the peripheral edge 15 surrounding the opening 10. This solution can be used when the relative position of the oil filler cap and the filler neck is used for facilitating an ergonomic grip or for the user. When gripping a substantially U-shaped handle 19 and removing the oil filler cap 2 the user should be required to apply as little force to the handle 19 as possible. For instance, when tilting an oil filler cap having three asymmetrically positioned tongues in what is deemed the most natural direction for the user, an imaginary axis around which the oil filler cap is tilted should be substantially parallel to a line intersecting the base of the pair of resilient tongues located closest together. The force applied by the user is thereby substantially concentrated to the single remaining resilient tongue. In addition, a correctly positioned oil filler cap can be used for conveying important or required information about the oil filler cap, the substance to be filled, etc. to the user. For this reason the oil filler cap should be mounted so that the text is oriented towards the user.

[0023] Alternatively, the fastening elements may be arranged symmetrically around the periphery of the peripheral wall. This can allow the user to attach the oil filler cap onto the filler neck at any relative position where the fastening elements mesh with corresponding guiding re-

cesses in a peripheral edge surrounding the opening at the upper portion of the filler neck. This solution may be used when the relative position of the oil filler cap and the filler neck is of less importance.

[0024] Figure 3 shows a lower perspective view of an oil filler cap 2 according to the invention. The oil filler cap 2 has been described in connection with Figure 1, as well as Figure 2 above. In Figure 3 the relative positions of the resilient tongues 6, 7, 8 are indicated. As shown by the resilient tongue 8, the tongue is separated from the resilient wall 5 by slots 21, 22, so that the resilient tongue 8 extends from an inner, lower surface 23 of the bottom 3 of the oil filler cap 2 to a position a short distance below a lower circumferential edge 24 of the peripheral wall 5. The resilient properties of the tongues 6, 7, 8 are determined by selecting a suitable material and calculating a desired length and with width of each tongue. In this embodiment the tongues are identical. The location of the asymmetrically positioned resilient tongues 6, 7, 8 has been selected so that the two tongues 7, 8 arranged closer together are also closer to the user when the oil filler cap 2 is to be removed.

[0025] The oil filler cap 2 is provided with a sealing means 25 for contacting the seal seat 11 of the filler neck 1 (see Fig.2). In this example the sealing means is an annular flat seal 25 comprising a resilient material, such as rubber. The type of material used in the seal 25 is selected so that it is suitable for exposure to the liquid filled into the filler neck, which in this case is engine oil. The annular flat seal 25 is held in place by a number of projections 26, 27, wherein a first set of projections 26 extend radially inwards from the inner surface of the peripheral wall 5. A second set of projections 27 extend radially outwards from the outer surface of a cylindrical wall 28 extending from the bottom 3 of the oil filler cap 2 and arranged to support and center the seal 25.

[0026] When removing the oil filler cap 2 the user will grasp the handle 19 and apply a force to tilt the said cap 2. When tilting the oil filler cap 2 having three asymmetrically positioned, first, second and third tongues 6, 7, 8 as shown in Figure 2, the user will tilt the oil filler cap 2 about an imaginary axis substantially parallel to a line intersecting the base of the second and third tongues 7, 8 located closest together. The force applied by the user is thereby substantially concentrated to the remaining first tongue 6. When the force applied by the user exceeds a predetermined limit, the first tongue 6 will flex radially outwards and move out of contact with the locking surface 16 in the recess 12 as the oil filler cap 2 is angled towards the user. Once the first tongue 6 is released, the oil filler may be removed.

[0027] When mounting the oil filler cap 2, the said cap is first aligned relative to the filler neck 1, using the first, second and third tongues 6, 7, 8 and their corresponding recesses 12, 13, 14, before being moved towards said filler neck 1. The resilient tongues 6, 7, 8 are first forced radially outwards when contacting the locking means on the filler neck 1. In order to facilitate this displacement of the resilient tongues, an inner surface 31, 32, 33 of the tip 34, 35, 36 of each resilient tongue is beveled so that the inner surface 31, 32, 33 at each tip is located radially outside a corresponding radially outer surface of the locking surfaces 16, 17, 18 at the periphery of the filler neck 1. As the a seal 25 on the closure comes into contact with the seal seat 11 around the opening 10 of the filler neck 1, contact surfaces 37, 38, 39 on the inner surface the resilient tongues 6, 7, 8 will substantially simultaneously snap into contact with their respective locking surfaces 16, 17, 18. The angle and/or the shape of the cooperating surfaces of the mating contact and locking surfaces, in combination with a continued radial deformation of the resilient tongues, will provide a sufficient force for retaining the oil filler cap 2 in place on the filler neck 1.

[0028] Figure 4 shows a cross-sectional view through the oil filler cap 2 and filler neck 1 of Figure 1. The figure shows the oil filler cap 2 in a position immediately prior to mounting (left hand section) and in its mounted position (right hand section). The cross-section is taken in a vertical radial plane through the resilient tongues shown in Figure 3.

[0029] Immediately prior to mounting, the resilient tongue 8 is guided into position by the recess 14. Continued downwards movement of the oil filler cap 2 causes the bevelled inner surface 33 at the tip of the tongue 8 to contact a similarly beveled, or rounded, portion 40 of the locking means. As can be seen in the figure, both the beveled portion 40 and the contact surface of the locking means face away from the central axis X of the opening 10. The resilient tongue 8 is first forced radially outwards as the oil filler cap 2 is pushed downwards. Once the bevelled inner surface 33 at the tip of the tongue 8 has passed the beveled portion 40 of the locking means, the resilient tongue 8 will snap back into a locking position. In this position, the contact surface 39 of the resilient tongue 8 is held in contact with the locking surface 18 of the locking means by said tongue 8. As the oil filler cap is pushed downwards, each resilient tongue 6, 7, 8 is arranged to snap into place substantially simultaneously. During the last downward movement of the oil filler cap, the flat annular seal 25 is arranged to contact and be partially compressed onto the seal seat 11 facing the oil filler cap 2. In order to reduce the risk of the seal sticking to the seal seat 11, the seat 11 is provided with a raised circumferential ridge 41 on its upper surface. When the seal 25 is pressed against the seal seat during mounting of the oil filler cap 2, the ridge 41 will be forced into the facing surface of the seal 25. The local compression of the seal caused by the ridge will assist in maintaining a tight and leak proof seal, as well as assisting in pushing the seal away from the seal seat when the cap is opened.

[0030] The invention is not limited to the above embodiments, but may be varied freely within the scope of the appended claims. For instance, Figure 4 shows a filler neck having an upper funnel shape, wherein the locking surfaces are arranged as protrusions around the upper portion of the filler neck. Alternatively, the filler neck

can have are substantially cylindrical shape, wherein the locking surfaces can be arranged as circumferential recesses in the outer surface of the filler neck.

Claims

1. A closure engageable with a filler neck comprising an opening and a seal seat disposed axially facing said closure, the closure comprising a cup-shaped body having a bottom and a peripheral wall, a sealing means for contacting said seal seat, and releasable fastening elements interacting with the filler neck, **characterized in in that** at least two fastening elements extend axially from the peripheral wall and that each fastening element is arranged to engage with a corresponding locking means located on the outer periphery of the filler neck remote from and facing away from the central axis of said opening.

2. A closure according to claim 1, **characterized in in that** each fastening element comprises a resilient tongue arranged to engage a corresponding locking means by means of a snap action.

3. A closure according to claim 1, **characterized in in that** each fastening element is an integrated part of the peripheral wall.

4. A closure according to claim 1, **characterized in in that** the closure comprises at least three fastening elements.

5. A closure according to claim 1, **characterized in in that** the fastening elements are arranged symmetrically around the periphery of the peripheral wall.

6. A closure according to claim 1, **characterized in in that** the fastening elements are arranged asymmetrically around the periphery of the peripheral wall.

7. A closure according to claim 1, **characterized in in that** the fastening elements are provided with contact surfaces angled towards the outer periphery of the filler neck for cooperation with the locking means comprising a circumferential protrusion extending around at least part of the filler neck.

8. A closure according to claim 1, **characterized in in that** the fastening elements are provided with contact surfaces angled towards the outer periphery of the filler neck for cooperation with the locking means comprising a circumferential recess extending around at least part of the filler neck.

9. A closure according to claim 1, **characterized in in that** the closure comprises guiding means interacting with the filler neck for locating the closure relative to the filler neck.

10. A closure according to claim 9, **characterized in in that** the closure comprises at least one guiding means.

11. A closure according to claim 9, **characterized in in that** the fastening elements are arranged to act as guiding means.

12. A closure according to claim 1, **characterized in in that** sealing means is an annular flat seal.

13. A closure according to claim 12, **characterized in in that** the sealing means comprises a resilient material.

14. A closure according to claim 12, **characterized in in that** the flat annular seal arranged for cooperating contact with a raised circular ridge on the seal seat.

15. A closure according to claim 12, **characterized in in that** the flat annular seal is provided with a raised circular ridge arranged for cooperating contact with the seal seat.

16. A closure according to claim 12, **characterized in in that** the closure is provided with a handle or grip having at least a portion thereof located remote from an upper surface of the closure.

17. Filler neck comprising an opening and a seal seat disposed axially facing a closure **characterized in in that** the filler neck is provided with locking means located on the outer periphery of the filler neck remote from and facing away from the central axis of said opening for cooperating with at least two fastening elements on a closure according to claim 1.

18. Filler neck according to claim 17, **characterized in in that** the locking means comprises a circumferential protrusion extending around at least part of the filler neck.

19. Filler neck according to claim 17, **characterized in in that** the locking means comprises a circumferential recess extending around at least part of the filler neck.

20. Filler neck according to claim 17, **characterized in in that** the seal seat comprises a raised circumferential ridge arranged for sealing contact against the sealing means.

21. An internal-combustion engine having a filler neck with a filler opening which opening is provided with a closure according to claim 1.

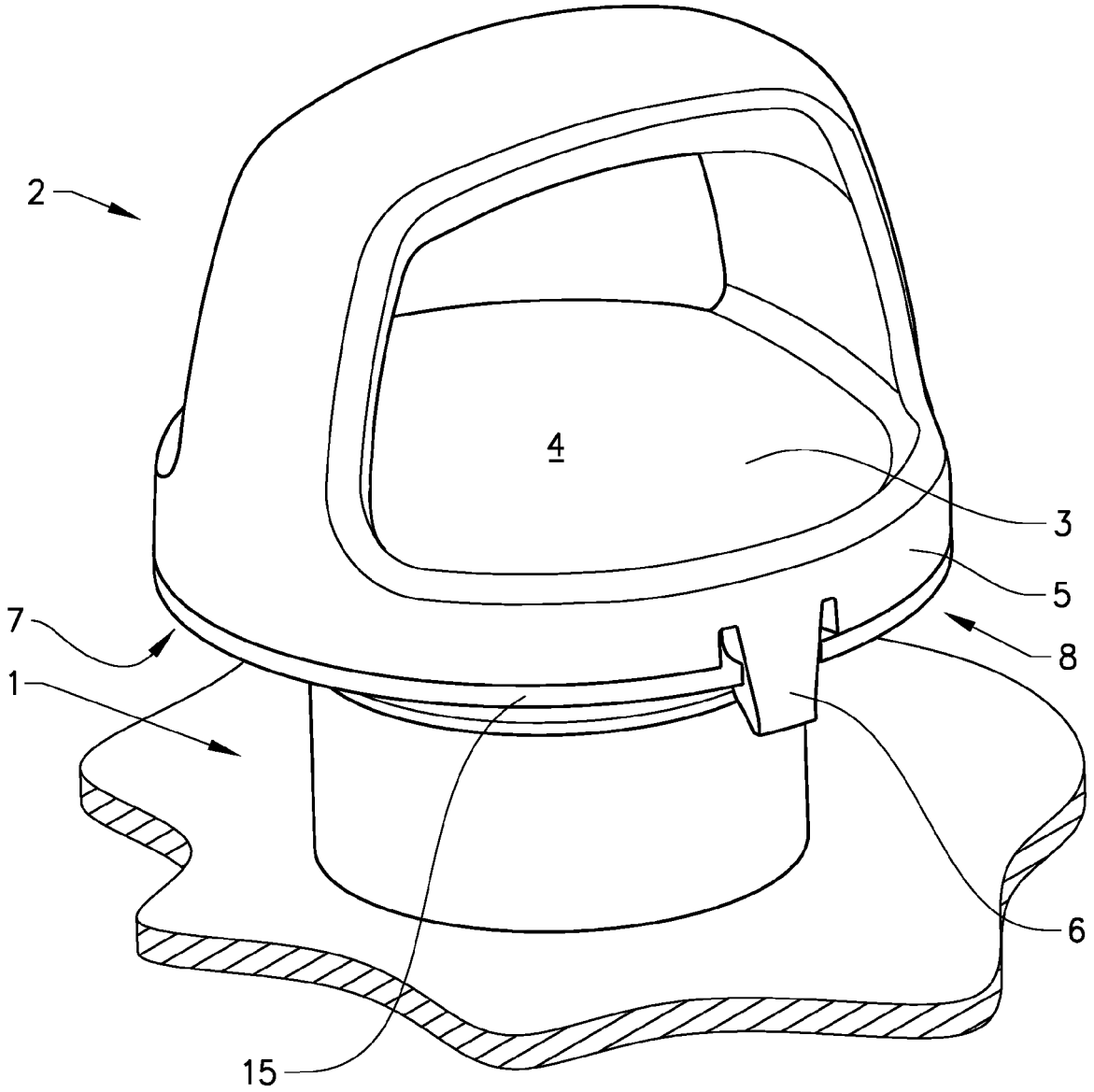


FIG. 1

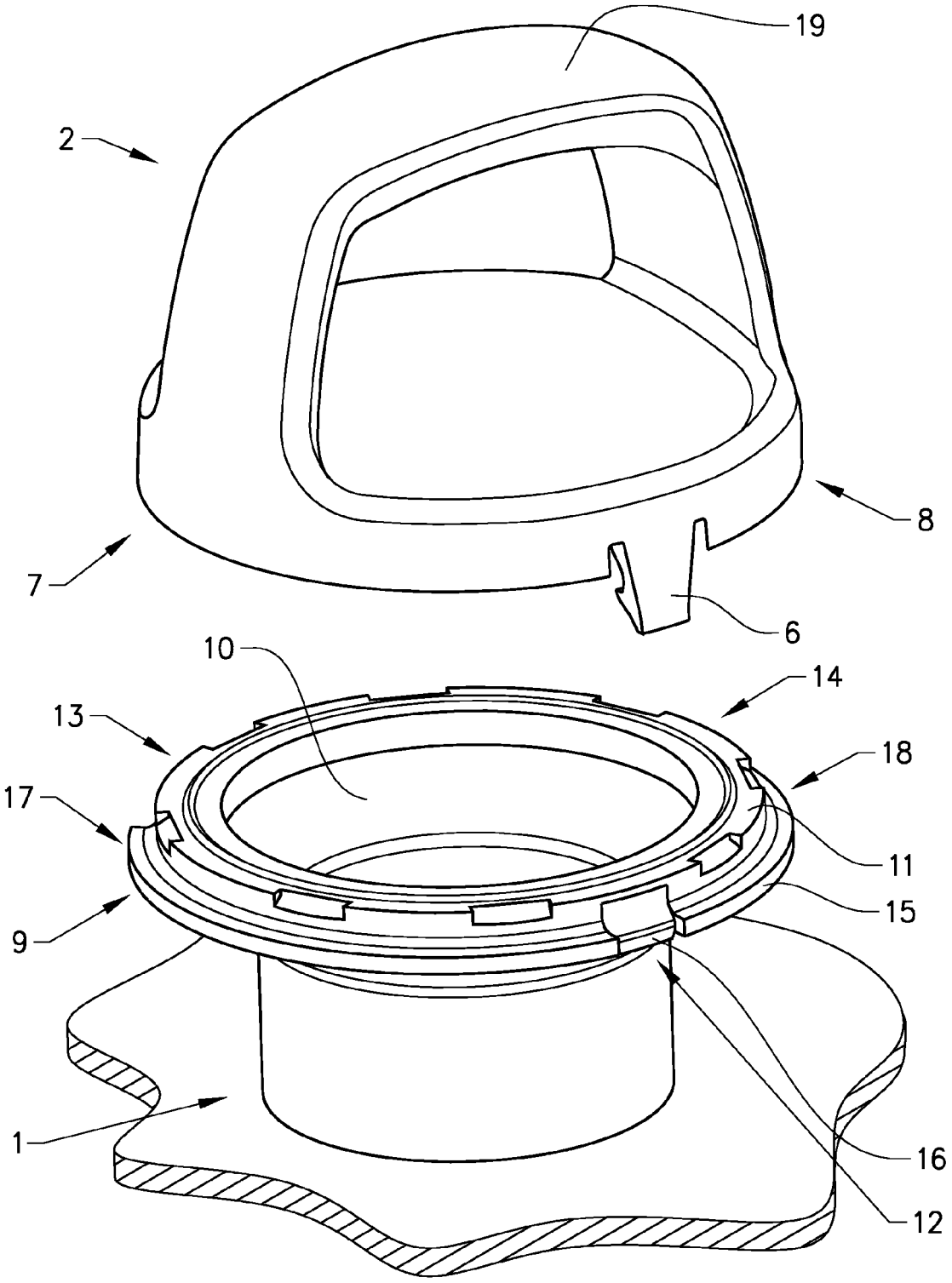


FIG. 2

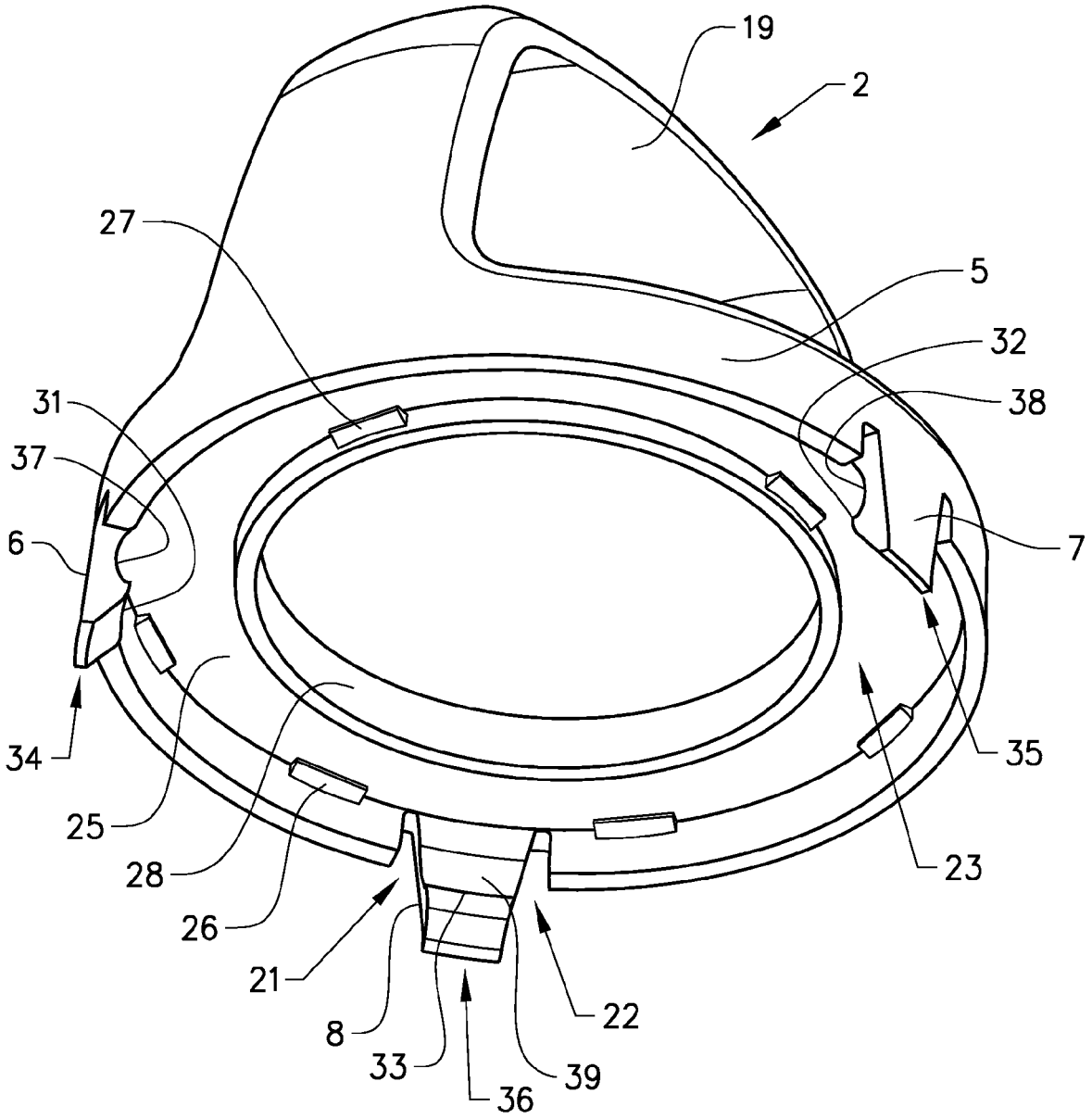


FIG. 3

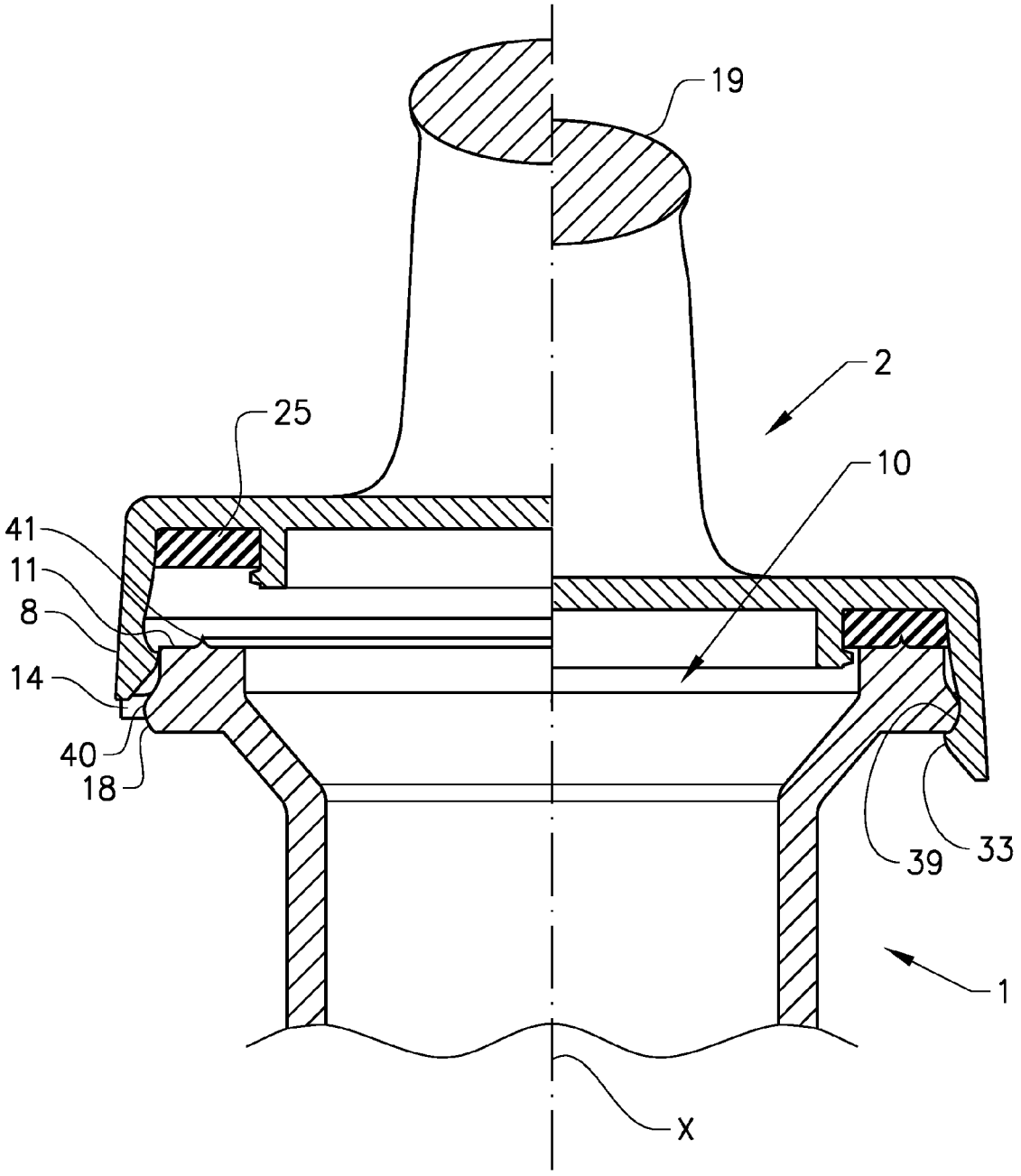


FIG. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 10 0431

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	15 June 2007	SLEIGHTHOLME, G

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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